

thogalum, *Muscari*, and *Iris*, although in these last four plants either raphides or the larger prisms always abound.

Amaryllidaceæ.—Raphides plentiful in the leaves, scape, and ovary of *Sternbergia lutea*, and in the leaves of *Brunsvigia Josephinæ*; but very scanty in a garden hybrid *Amaryllis*, and not seen at all in a leaf of *A. Belladonna*. Leaf of *Pancreatum maritimum*: raphides small, and not plentiful. *Alstræmeria*, sp.: raphides in the scape, leaf, perianth, filaments, and anthers; abounding also in the bulb, bulb-scales, and leaves of *Leucojum vernum*. Leaf of *Fourcroya gigantea*: a few true raphides and an abundance of larger crystal prisms; these last are four-sided, mostly with two faces broader than the other two, and the ends either wedge-shaped or obliquely pointed.

[To be continued.]

Edenbridge, Dec. 8, 1864.

VII.—On the *Affinities of some doubtful British Fishes.*

By THEODORE GILL*.

1. OPHIDIUM IMBERBE, Montf.

In 1811, in the ‘Memoirs of the Wernerian Society,’ Montagu† described and figured the fish identified by him with the *Ophidium imberbe*. It was “taken on the south coast of Devon,” and in “length was about 3 inches;” the body “ensiform;” “the dorsal fin commences immediately above the base of the pectoral, and is at first not so broad, and usually not so erect as the other part,” and the caudal is cuneiform and obtusely pointed. “The colour is purplish brown, disposed in minute speckles; and along the base of the anal fin are about ten small bluish-white spots, regularly placed, but scarcely discernible without a lens, possibly peculiar to younger fishes.” The rays were respectively—pectoral 11, dorsal about 74, anal 44, caudal 18 or 20. Such was the first detailed account of *Ophidium imberbe*, based on a British fish, and such the authority on which the subsequent British faunists have preserved the species in their catalogues. By Turton‡, Fleming§, Jenyns||, Yarrell¶, Gray**, &c., it has been retained in the genus *Ophidium* (§ *Fieras-*

* Communicated by the author, having been read before the Academy of Natural Sciences, Philadelphia.

† Mem. Wern. Soc. i. (1811) p. 95, pl. 4. fig. 2.

‡ Brit. Faun. (1807) p. 83.

§ Brit. An. (1828) p. 201.

|| Man. (1835) p. 231.

¶ Brit. Fishes, ii. (1841) p. 412.

** List Brit. An. Brit. Mus., Fishes, (1851) p. 51.

fer), while more recently Kaup*, Richardson†, and Günther‡ have transferred it to the genus *Gymnelis*; the first originally under the name of *Cepolophis* §. It remains to examine into the grounds for such approximations.

It is not probable that a fish whose dorsal fin arrested the attention of Montagu on account of its being so "erect" could have been a Malacopterygian; and this character, as well as the distinctness of all the rays, the development of the caudal, whose rays are longer than those of the dorsal and anal, the relations of the various parts, and even the gill-membranes inflated beneath, renders it evident that the fish in question could have been in nowise related to either *Ophidium*, *Fierasfer*, or *Gymnelis*, all of which are Malacopterygians with caudal rays shortest and not developed as a distinct fin. Its affinities are therefore to be sought for in another direction. The general form, the "erect" dorsal fin, and the number of rays agree with *Muraenoides gunnellus*. The colour is in that species sometimes simply "purplish brown," the dorsal spots becoming obsolete; and in a single specimen from England, in the Smithsonian collection, several anal spots are barely discernible||. The failure to observe the ventrals was shared with Schonevelde, Schelhammer, Linnæus, &c.; and we are more prepared for their non-observance by Montagu when we remember his peculiar views concerning the ventral fins¶. Objections may be urged against this identification—that Montagu would have recognized the *Muraenoides gunnellus*, that the proportions represented in his figure are not precisely equivalent to those of that species, and that the critical Cuvier and all succeeding naturalists have failed to notice the

* Cat. Ap. Fishes, (1856) p. 156.

† Yarrell, Brit. Fishes, (Richardson's ed.) i. p. 79 (*vide* Günther).

‡ Cat. Fishes, iv. (1862) p. 325.

§ Arch. für Nat. (1856) i. p. 97.

|| These light dots are accidental, none being developed in other specimens from England, Denmark, and the German Ocean.

¶ The reference, by Dr. Shaw, of *Vandellius lusitanicus* (= *Lepidopus caudatus*) to the thoracic order "caused the obscurity of *Vandellius lusitanicus*, as no one could have expected to have found an Apodal fish placed in that division. How that naturalist could have fallen into such an error I cannot conceive, unless he considered the pair of ventral scales as rudiments of those fins, or what is commonly attached to the base of the ventral fins of some fishes, as may be observed in many Spari." "I am aware that it has been contended that these abdominal scales are lamellated ventral fins. If so, we have yet to learn the definition of a fin in the modern revolution of science. Those who contend for the continuance of *Vandellius* of Shaw or for the *Lepidope* of Risso being continued in the Thoracic order must also constitute a new order for many fishes that have such lamellated appendages, independent of two ventral fins. But I cannot admit of a simple corneous scale, destitute of motion, being a ventral fin."—Montagu, in Mem. Wern. Soc. ii. (1818) pp. 432, 433.

identity. I shall only recall the admission that Linnæus himself, after autopsy, referred one specimen of the same species to *Blennius (gunnellus)*, and another to *Ophidion (imberbe)*, that Montagu wrote in the year 1812, and in the infancy of ichthyology, when the importance of attention to minutiae was less generally appreciated than now, and that the identification of his fish with *Muraenoides gunnellus* was probably stayed by the improbability of his failure to recognize that common species.

As Dr. Günther, in the synonymy of "*Gymnelis imberbis*"*, has represented the ideas of the English naturalists, and as his work is the last authority referring to it, an analysis and reduction of that synonymy to its proper elements will form a fitting conclusion to these remarks.

1. *Muraenoides*† *gunnellus*, ex L.

Ophidium imberbe, L.; Montag.; Turton, 88; Fleming, 201; Jenyns, 481; Yarrell, ed. 1. ii., ed. 2. ii. 412.

Cepolophis Montagu, Kaup.

Gymnelis imberbis, Kaup, Ap.; Rich. in Yarrell, ed. 3 (*fide* Gthr.).

2. *Carapus*‡ *acus*, Raf. ex Brün.

Ophidium imberbe, Lac. pt. (Radial formula and caudal fin of *Muraenoides gunnellus*.)

* Dr. Günther remarks that *Gymnelis stigma* and *G. imberbis* "probably do not belong to this genus."

Gymnelis stigma (*Ophidium stigma*, Lay and Benn., *sic*) is probably congeneric with, and perhaps even closely related to, *G. viridis*, and it at least greatly resembles some varieties of that variable species. The poor figure and the assignment of "very small" scales to it led me, on a former occasion, to think otherwise, like Dr. Günther; but we must remember that the notes and illustrations of *Ophidium stigma* were made by an inexperienced naturalist, and that he may have been deceived as to the presence of scales. However, we may also recall that there is a great variation in squamation in a genus representing a closely related subfamily, *Lycodes*.

† The question will naturally arise, among those who contend that we should date our nomenclature from the tenth edition of the 'Systema Naturæ' (that being the first in which the binomial system is introduced), whether we should not replace the name *Muraenoides*, *Centronotus*, or *Gunnellus* by *Ophidium*. Perhaps this will eventually be done, since the genus was well defined and its diagnosis only applicable to the *O. imberbe*. Others may contend that the name must be retained for the first species (*O. barbatum*), in spite of its total disagreement. The decision of this question may be suspended till the publication of the new rules of the British Association.

‡ The name *Carapus* was first connected with the *Gymnotus acus* by Rafinesque (Ind., 1819, pp. 37, 57), who only referred to that species, although he doubtless intended his genus to correspond with Lacépède's anonymous second subgenus of *Gymnotus*, which included *G. carapus*, L., *G. acus*, L. (= *Fierasfer acus*, Kaup) and *G. rostratus*, L. (= *Rhamphichthys rostratus*, M., T.). A strict adherence to the laws will, however, necessitate the retention of the name for the only species mentioned, *C. acus*.

3. *Muræna** *Anguilla*, L. (or allied sp.).

“*Beardless Ophidium*,” Pennant, Brit. Zool. iii. 398; App. tab. 33.

2. “TRICHIURUS LEPTURUS.”

The question which we shall next consider relates to the specimens identified by Mr. James Hoy† with the *Trichiurus lepturus* of Linnæus.

In the ‘Transactions of the Linnæan Society,’ Mr. Hoy has published an account of two fishes stranded, at considerable intervals of time, “upon the shore of the Moray Frith, near the fishing village of Port Gordon.” The first specimen was found “on the 2nd of November, 1810, after a high wind from the north;” “its head was much broken;” “the extremity of the upper jaw, or upper part of the mouth, was entire; upon *either side of which was an operculum*;” “the body, from the gills to the point of the tail, was 3 feet 2 inches long; its greatest breadth $6\frac{1}{4}$ inches, and its greatest thickness only an inch;” “both sides of the fish were wholly white, without a spot upon them;” “the dorsal fin was the only part of a different colour, being a blackish green; this ran all the way back from the gills to the tail;” “the tail ended in a point, consisting of three or four soft spines or bristles of different lengths, not exceeding 2 inches. The* body was nearly of the same breadth for one half of its length, and then its breadth diminished gradually till within 3 inches of the tail, when the diminution became more quick. The lateral line was straight, and strongly marked along the middle of the two sides.”

The second specimen was obtained on the 12th of November 1812; “its head had been broken off, and was quite gone; a small bit of the gills only remained, about the upper part of the throat, from whence to the extremity of the tail its length was 12 feet 9 inches; its breadth, $11\frac{1}{4}$ inches, was nearly equal for the first six feet in length from the gills, diminishing gradually

* Bleeker is doubtless correct in retaining the name *Muræna* for the *M. Anguilla*. The name was restricted by Bloch, who first subdivided the genus, to the type represented by that species; and the *M. Anguilla* was evidently the one on which Artedi and Linnæus based their diagnoses. Repugnant as must be such perversions of names, consideration for the uniformity of nomenclature, which may best be attained by strict adherence to the laws, seems to require assent to them. The genus *Anguilla* is generally attributed to Thunberg; but a search instituted among his various memoirs has failed to reveal any mention of it, and it is to be remarked that no naturalist has referred to any precise work. Professor Agassiz, indeed, refers to “*Anguilla*, Thunb., Nuov. Mem. Stockh. 179—,” but no such generic name is to be found in the series referred to under that title.

† Trans. Linn. Soc. xi. p. 210.

from thence to the tail, which ended in a blunt point, without any of those kind of bristles which projected from the tail of the one found formerly; its greatest thickness was $2\frac{1}{2}$ inches, the distance from the gills to the anus 46 inches. The dorsal fin extended from the head to the tail," &c. "There were no ventral nor anal fins; but the thin edge of the belly was closely muricated with small hard points, which, although scarcely visible through the skin, were very plainly felt all along it. Both sides of the fish were white, with four longitudinal bars of a darker colour; the one immediately below the dorsal fin was about 2 inches broad, each of the other three about $\frac{3}{4}$ inch. The side line straight along the middle."

On the authority of these specimens, the *Trichiurus lepturus* was admitted by the British faunists into the catalogues of their fishes.

Dr. Fleming* considered that the two specimens belonged to different species. "The differences in the position of the vent, the structure of the tail, and the condition of the edge of the belly, seem too great to justify the inference of their being only varieties. The latter fish appears identical with the *Lepturus* of Artedi, and consequently of Linnæus."

Subsequently Dr. Fleming † considered that "the position assigned to the vent, the absence of ventral fins, and the white colour of the sides (of Hoy's first specimen), all accord with the Dealfish (*Trachypterus*). The colour of the dorsal fin, however, which was of a blackish green, seems to oppose this view, though the dead state of the fish may probably serve to explain this difference, if duly considered."

Mr. Jenyns ‡ was inclined to adopt Dr. Fleming's opinion—"that the first specimen of Hoy was a distinct species, if not belonging to a different genus. There can be no doubt that the one described above (Hoy's second specimen) was a true *Trichiurus*, and probably *T. Lepturus* of Linnæus and other authors; but as the description is rather imperfect, and the species of this genus ill determined, it is impossible to speak with certainty on this last point."

Yarrell § especially alluded to the median lateral line and lateral bands, and remarked that "it is evident that more information on the subject is required; the result of it may be the establishment of Mr. Hoy's second fish as a new species of *Trichiurus*, and of his first fish (which is evidently distinct from the second) as the type of a new genus, if, as Dr. Fleming has

* Brit. An. (1828) p. 204.

† Loudon's Mag. Nat. Hist. iv. (1831) p. 219.

‡ Manual, (1835) p. 872.

§ Brit. Fishes, i. (1841) p. 204 (207).

suggested, it was not a mutilated example of the Dealfish of the Orcadians, *Gymnetrus arcticus*."

With enlarged opportunities for arriving at a possible decision concerning at least the second specimen, I proceed to institute inquiries into the nature of these materials. The form and approximately the proportions noticed by Hoy, the "operculum on each side" of the mouth, simulated by the supramaxillars, the soft dorsal rays, the bristles at the end of the tail, and the strongly marked straight lateral line appear to indicate, as Fleming has suggested, that Hoy had before him in his first specimen a much injured example of *Trachypterus* with most of its fins destroyed; and it is probable that a hole, caused by the caducous ventral fins, might have been mistaken for the anus*. This may seem very remarkable; but it is evident that Mr. Hoy has not the slightest claim to scientific consideration, and the hole so created in *Trachypterus* would correspond in space to the "anus" discovered by that gentleman. A thoracic anus is incompatible with the structure of the Trachypteroids or any related forms. The "blackish-green" colour of the portion of the dorsal remaining might have been due to discoloration; and we need not be much astonished that the lateral dorsal spots were overlooked in such a specimen.

The second of Hoy's specimens evidently belonged to an entirely different type. The form and "closely muricated" belly indicate that it was related to the family of Lepturoids or Trichiuroids; but the "blunt point" in which the tail terminates, as well as the median lateral line, forbid us, on morphological grounds alone, referring it to *Trichiurus lepturus*. It might be supposed to have been a specimen of *Lepidopus caudatus*, were it not for the colour; but that, sustained by the superior height, forbids us to refer it to that species. What, then, can it have been?

In the summer of 1863, I received from the learned Cuban naturalist, Prof. Poey, of the University of Havanna, a fish, concerning whose systematic position he was unable to satisfy himself. This fish was found to resemble *Lepidopus caudatus* in all essential characters except the remarkable form of the head, which was exceedingly compressed, trenchant and obliquely decurved above, with the forehead elevated above the eyes, and

* This same mistake, indeed, was made in the communication by Dr. Duguid to Dr. Fleming concerning the same fish (see Loudon's Mag. iv. (1831) pp. 215, 216); and Dr. Fleming himself, so far from correcting the error, alluded to the similarity of the so-called vent as evidence of the pertinence of Hoy's fish to the same species (*op. cit.* iv. 219). By a somewhat singular coincidence, the same error in identification of *Trachypterus* with *Trichiurus lepturus* was made by Olafsen (Voyage to Iceland, p. 592).

the chin obtuse. Notwithstanding such characters, its affinity to *Lepidotus* was evidently so great, the form, structure of the fins, especially the anomalous form of the pectorals, and the development of the opercular bones coinciding, that I felt compelled to retain it in the same subfamily, in contradistinction to one containing *Trichiurus* (= *Lepturus*, Art.) and *Eupleurogrammus**. The colour arrested my attention, there being six or seven narrow bands, the lateral line running through the fourth; the interval between the two dorsal bands was more indistinct, and the two might readily be confounded; the width of the two would equal about a sixth of the height, while the width of the single ones was contained about fifteen or sixteen times in the height. The two lower bands were more indistinct. I was therefore at once reminded of the *Trichiurus lepturus* of Hoy; and the similar development of the bars, as well as the approximation in proportions, compel me to believe that Hoy's second specimen is in reality a species of the genus *Evomyxymetopon*, if not indeed identical with the Cuban fish itself (*E. tæniatus*, Poey). The greatest height of the latter, at the scapular region, is contained scarcely more than twelve times ($12\frac{1}{2}$) in the extreme length, while a short distance behind, and for a considerable distance, it is contained from thirteen and a half to fourteen times. The head is contained eight times and a half, and the caudal, at its longest rays, twenty-nine times and a half in the same. The anus is midway between the snout and the root of the caudal. In this last respect it disagrees with the specimen signalized by Hoy, according to whom the anus was very considerably within the limits of the first third of the length ($46:153 + \chi$). Such a position is extremely improbable in a representative of the subfamily of Lepidopodinæ, to which the specimen doubtless belongs. The true anus, on account of its small size, was probably overlooked, and a rupture of the skin mistaken for it. May we not hope that some British naturalist will soon release us from our doubts, and verify the systematic position of Hoy's fish?

3. POLYPROSOPUS, Couch.

Having provisionally adopted the generic name *Polyprosopus*, proposed by Couch in the 'Analytical Synopsis of the Order of Squali,' remarking at the same time that the genus was "not yet well established," it seems advisable now to express my con-

* Gill, "Synopsis of the Family of Lepturoids, and Description of a Remarkable New Generic Type," in 'Proc. Ac. Nat. Sc. Philadelphia,' 1863, p. 224, &c. In this article I have suggested the relation of Hoy's fish and *Evomyxymetopon tæniatus*.

viction that it belongs to the genus *Cetorhinus* or *Selache*, and that the differences observed are probably due to distortion or defective observation. I have already stated that "the absence of caudal carinæ or spiracles is quite improbable;" and certainly no ichthyologist could believe in the absence of the anal fin in such a type.

I may finally be permitted to add, in anticipation of a more extended memoir, some remarks on the Lemniscates of Richardson, and more especially the *Leptocephalus Morrisii*, Gm. The recent exposition of the character of such fishes by Professor V. Carus* will excuse this anticipation. I am happy to be able to express my unqualified belief in the conclusion as to their being simply larval forms, which that learned naturalist has enunciated. As long as the known hyaline fishes conformed to a single type, naturalists might be excused for regarding them as fully developed forms; but the doubt this group was first subjected to by the failure of Kölliker † to find organs of generation, was increased by the addition (by Kaup) of the genus *Esunculus* ‡, and subsequently of *Stomiasunculus* §. Carus was therefore, I think, fully justified in his "conclusion that all these fishes are nothing but larval forms of others." But he was not so happy in looking for the adults "among the Ophidians or other compressed forms" (*Cepola*, and so on ||). I am almost certain that the typical *Leptocephali*, at least, are the young of Congers, and that *Leptocephalus Morrisii* is the young of *Conger vulgaris*. I am aware, indeed, that Yarrell ¶ has discovered that small Congers, "about the size (length?) of a man's finger, are found among the rocks, close to land, during the summer." But he immediately afterwards adds that "the small eels which ascend the Severn in such numbers in the spring, and were considered by Willughby and Pennant as the young of the Conger, are in reality the young of freshwater eels." May we not go a step further, and ask that it may be demonstrated that those "found among rocks close to land" are Congers, and not eels which have not yet commenced ascending the rivers?

The *Hyoproprus Messinensis*** appears likewise to be merely the

* On the Leptocephalidæ, in Rep. Brit. Ass. 1861, p. 125.

† Zeitschrift für Wiss. Zool. iv. p. 360.

‡ Apodal Fishes, (1856) p. 143, fig. 3.

§ Ann. & Mag. Nat. Hist. ser. 3. vol. vi. (1860) p. 270.

|| See the remarks of Dr. Peters on this question in the following article.—ED. ANNALS.

¶ Brit. Fishes, ii. (1841) p. 404.

** Kölliker, Verh. d. Phys. Med. Gesellsch. in Würzburg, iv. p. 101.

larval form of the Congroid *Nettastoma melanura* *. The resemblance between those two forms will be readily appreciated by reference to Dr. Kaup's figures of the two. Perhaps the affinities of those *Leptocephali* with an expanded caudal are to be sought for elsewhere. As to *Esunculus Costai*, it resembles the young of a Clupeoid; but the high insertion of the pectoral fins, if existent in nature, forbids for the present its positive identification with such. *Stomiasunculus* resembles, in general features, a less advanced larval Clupeoid, about three days old †, in which the ventral fins have not yet appeared. Suspicion, however, may be entertained that it may perhaps be the young of some other type (possibly Stomiadoids), on account of the backward position of the dorsal fin. I have myself, in company with a friend, seen the young of Clupeoids, which would have either been referred to *Esunculus* or considered as the type of a closely allied new genus, on account of the inferior insertion of the pectoral fins; and so transparent were they, that their eyes alone indicated their position in the water. Although entertaining no doubts concerning the larval nature of *Esunculus* and *Stomiasunculus*, I only venture to suggest the possible relations with much reserve. As to *Porobronchus*, Kaup ‡, it is, perhaps, related to *Fierasfer*; but the character of the first elongated dorsal ray requires to be known before a decision can be arrived at.

VIII.—*Description of a new Species of Leptocephalus.*
By Professor PETERS §.

Leptocephalus (Diaphanichthys) brevicaudus, Peters.

Body very much compressed; profile of the ventral margin convex, of the back nearly straight. Snout very acute, convex before the eye, a little shorter than the diameter of the eye; mouth cleft as far as beneath the middle of the eye, armed on each side, both above and below, with eight straight acute teeth, behind which, in the upper jaw, are some smaller acute teeth. The posterior nasal apertures are situated on the muzzle, rather nearer to the eyes than to the apex. The eyes are placed in the middle of the head. Branchial clefts very narrow. *No pectoral, dorsal, or anal fins*, the extremity of the body only being surrounded by the caudal fin, which extends above and below for

* Raf. Caratteri, &c. (1810) p. 66, tav. 16. f. 1.

† See Sundeval, "Om Fiskyngels Utveckling," in Kongl. Vet. Akad. Hand. i. (1855) tab. 4. fig. 6.

‡ Ann. & Mag. Nat. Hist. ser. 3. vi. (1860) p. 272.

§ Translated by W. S. Dallas, F.L.S., from the 'Monatsber. Berl. Akad. der Wiss.' June 1864, p. 399.